

**Remarks**

Claims 1-18 are pending in the application. Reconsideration and allowance of the application are respectfully requested.

The non-final Office Action dated November 1, 2007 lists the following objections and rejections: the drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) and 37 CFR 1.83(a); the title of the invention is objected to as not being descriptive of the invention; the specification is objected to as failing to provide proper antecedent basis for the claimed subject matter; claims 1-14 are objected to due to informalities; claims 9 and 12 stand rejected under 35 U.S. C. § 112(2); claims 1, 4-7, 9-10 and 12-14 stand rejected under 35 U.S.C. § 103(a) over Omura *et al.* (EP 1168455); claims 2 and 11 stand rejected under 35 U.S.C. § 103(a) over Omura in view of Onda *et al.* ("SIC Integrated MOSFETs" Physica Status Solidi (A), Applied Research, Berlin, DE, vol.162, no. 1, 16 July 1997, pages 369-388); claim 3 stands rejected under 35 U.S.C. § 103(a) over Omura in view of Miyano *et al.* (JP 403211885); claim 8 stands rejected under 35 U.S.C. § 103(a) over Omura in view of Hshieh *et al.* (U.S. Patent Pub. 2001/0003367).

In response to the drawing objection under 37 CFR 1.84(p)(5), Applicant has amended the specification to include the reference numeral 42 as indicated on page 2 of this paper. Thus, Applicant requests that this objection be removed.

Applicant respectfully traverses the objection to the drawings under 37 CFR 1.83(a) because the applicant for a patent is only required to furnish a drawing of his or her invention where necessary for the understanding of the subject matter sought to be patented. *See, e.g.*, 37 CFR 1.81(a). Regarding claim 13, Applicant submits that aspects of the claimed invention directed to the field plate electrode being connected to the source region would be clear to one of skill in the art based upon Applicant's disclosure. *See, e.g.*, Figures 1 and 2; and Paragraphs 0049 and 0052. For example, a single metallization may function as the source contact 16 and the field plate contact 38. Regarding aspects of claim 14 directed to a field plate terminal connected to the conductive field plate electrode, Applicant submits that Figure 3 shows a field plate contact 38 that contacts field plate 34. As such, the above discussed aspects of claims 13-14 would be clear to the skilled artisan based upon Applicant's disclosure. Accordingly,

the objection to the drawings under 37 CFR 1.83(a) is improper and Applicant requests that it be removed.

In response to the objection to the title of the invention, Applicant has provided a new title that is consistent with that suggested by the Examiner as indicated on page 3 of this paper. Thus, Applicant requests that the objection to the title be removed.

Applicant respectfully traverses the objection to the specification because the identified aspects of claims 9 and 12 are adequately supported by Applicant's disclosure. Regarding aspects of claim 9 directed to the thickness of the field plate insulator being greater than the thickness of the gate insulator, Applicant submits that support can be found, for example, in Figure 1 which shows that the field plate insulator 44 is thicker than the gate insulator 42. Regarding aspects of claim 12 directed to the thickness of the field plate insulator being between 0.6 and 1 microns and the thickness of the gate insulator being between 0.2 and 0.5 microns, Applicant submits that support can be found, for example, in Paragraph 0054 which states that the oxide adjacent to the gate 32 is 0.39 microns thick and that the oxide adjacent to the field plate is 0.8 microns thick. Thus, the objection to the specification is improper and Applicant requests that it be removed.

In response to the objections to claims 1-14, Applicant has amended certain claims in a manner consistent with that suggested by the Examiner. As such, Applicant requests that the objections to claims 1-14 be removed.

Applicant respectfully traverses the § 112(2) rejection of claims 7-8 because these claims do particularly point out and distinctly claim that which Applicant regards as the invention. Applicant submits that the skilled artisan would clearly recognize that the trench filled with conductive material introduced in claim 7 is different from the insulated trenches recited in claim 1. However, in an effort to facilitate prosecution, Applicant has amended claims 7-8 to recite "an additional trench" and "the additional trench" respectively. Accordingly, Applicant submits that the § 112(2) rejection of claims 7-8 is moot and Applicant requests that it be withdrawn.

Applicant respectfully traverses the § 103(a) rejections of claims 1-14 (each of which is based upon the Omura reference) because the cited portions of Omura do not correspond to the claimed invention which includes, for example, aspects directed to the

drift region having a steeply graded doping concentration, with the concentration increasing from the body region to the drain region (*i.e.*, the concentration is at least 50 times greater adjacent to the drain region than adjacent to the body region). Applicant's disclosure teaches benefits associated with having a steeply graded concentration gradient. *See, e.g.*, Paragraphs 0021-0022. However, the cited portions of the Omura reference provide no appreciation of or recognition for such benefits, and thus any proposed modification would appear to be improperly based upon Applicant's disclosure. *See, e.g.*, M.P.E.P. § 2142. More specifically, the cited portions of Omura simply teach that the impurity concentration of drift layer 12 increases toward the substrate 11. *See, e.g.*, Figure 2 and Paragraph 0053. The cited portions of Omura do not provide any indication regarding the level of impurity concentration in drift layer 12 near well layer 13 relative to the level of impurity concentration in drift layer 12 near substrate 11, let alone teach that the doping concentration in the drift region has a steeply graded concentration gradient as in the claimed invention.

Moreover, the cited portions of the Omura reference further fail to correspond to aspects of the claimed invention directed to the thickness of the gate-field plate insulator being greater than or equal to the thickness of the field plate insulator. In contrast, Omura teaches that the insulator between buried electrode 19 and gate electrode 17 (*i.e.*, second insulating film 18) has a thickness between 400 to 450Å, whereas the insulator for buried electrode 17 has a thickness of 3000Å. *See, e.g.*, Figures 7-14A and Paragraphs 0037-0041. Thus, the insulator between buried electrode 19 and gate electrode 17 is substantially thinner than the insulator for buried electrode 17.

In view of the above, the cited portions of the Omura reference do not correspond to the claimed invention. Accordingly, the § 103(a) rejections of claims 1-14 are improper and Applicant requests that they be withdrawn.

Applicant further traverses the § 103(a) rejection of claim 3 based upon the Miyano reference (JP 403211885A) because the Office Action cites to the Abstract of the Miyano reference without relying on the underlying document or providing a corresponding English translation of that document as is required. "Citation of an abstract without citation and reliance on the underlying scientific document itself is generally inappropriate where both the abstract and the underlying document are prior art." *Ex*

*parte* Jones, 62 USPQ2d 1206, 1208 (Bd.Pat.App. & Int. 2001). “[A] proper examination under 37 CFR § 1.104 should be based on the underlying documents and translations, where needed. Accordingly, the preferred practice is for the examiner to cite and rely on the underlying document.” *Id.* “To determine whether both the abstract and the underlying document are prior art, a copy of the underlying document must be obtained and analyzed.” *See*, M.P.E.P. § 706.02. In this instance, the Office Action cites to the Abstract of the Miyano reference without relying on the underlying document or providing an English translation of that document.

Moreover, as best as can be understood due to the lack of a translation of the Miyano reference, Miyano teaches a single gate electrode 3 in an insulated trench, with the gate electrode being in close proximity to the drain region 11. *See, e.g.*, the Abstract. In contrast, Omura teaches a trench containing two electrodes, with buried electrode 17 being located in trench 15 between gate electrode 19 and substrate 11. *See, e.g.*, Figure 2. Thus, the Miyano and Omura references teach devices with substantially different configurations. However, the Office Action has not provided any evidence that replacing Omura’s gate electrode 19 with Miyano’s gate electrode 3 would reduce the capacitance between the electrode and substrate 11 in Omura’s device. As such, the Office Action fails to provide a sufficient reason why the skilled artisan would combine the references as required. *See, e.g., KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (U.S. 2007) (“A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art.”).

In view of the above, § 103(a) rejection of claim 3 is improper and Applicant requests that it be withdrawn. Should any rejection based upon the Miyano reference be maintained, Applicant requests an English translation of the underlying document and an opportunity to respond thereto.

Applicant further traverses the § 103(a) rejection of claim 7 because the cited portions of the Omura reference do not correspond to aspects of the claimed invention directed to an additional trench filled with conductive material that extends through the source region to the body region. The Office Action improperly asserts that Omura’s source electrode 21 extends in a trench through source layer 14 to well layer 13. As is clearly shown in Figure 4, Omura’s source layer 14 and well layer 13 each extend to the

surface of Omura's device where they connect to source electrode 21. Omura's source electrode 21 does not extend through source layer 14 to well layer 13 as does the additional trench filled with conductive material of the claimed invention. *See, e.g., Applicant's Figure 3.* Accordingly, the § 103(a) rejection of claim 7 is improper and Applicant requests that it be withdrawn.


Applicant has added new claims 15-18. Applicant respectfully submits that claims 15-18 are allowable over the cited references for at least the reasons discussed above. For example, none of the references teach or suggest that the drift region has a steeply graded doping concentration, with the concentration increasing from the body region to the drain region.

In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Peter Zawilski, of NXP Corporation at (408) 474-9063 (or the undersigned).

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